CASE REPORT

Idiopathic Osteonecrosis of the Third Metacarpal Head

Ming-Hsiao Hu,[1,2] Wen-Chih Chen,[1] Chih-Hung Chang[1]*

Osteonecrosis of the metacarpal head is a rare disease entity and there are only a few isolated case reports in the literature. No single modality of treatment can be recommended as ideal. In this report, we describe a patient who presented with changes resembling avascular necrosis at the third metacarpal head of the right hand. It presented as a 2-week history of sudden onset of pain in the region of the right third metacarpophalangeal joint with limitation of flexion. We treated the 51-year-old male patient by curettage, debridement and multiple drilling. At 1-year follow-up, the patient was symptom-free and showed improved range of motion of the metacarpophalangeal joint (0° to 80°). He returned to his original work 2 weeks after the operation without limitation of daily activities. This report presents a new operative treatment that improved the functional outcome of osteonecrosis of the metacarpal head. [*J Formos Med Assoc* 2008;107(1):89–92]

Key Words: curettage, metacarpal head, osteonecrosis

Osteonecrosis of the metacarpal head is a rare disease entity and there are only a few isolated case reports in the literature.[1–4] It was first reported by Dieterich in 1932.[5] The symptoms range in severity. Sometimes, it may remain asymptomatic, but it may also be painful and lead to restricted range of motion of the metacarpophalangeal joint. Because of the limited experience with this problem, no single modality of treatment can be recommended as ideal. Although symptoms may resolve with non-operative treatment, progressive collapse of the lesion and subsequent degenerative arthritis is a possible long-term outcome. Curettage of the lesion and supplementary cancellous bone grafting have been reported to provide symptom relief in cases that are resistant to non-operative treatment.

In this report, we describe a patient who presented with changes resembling osteonecrosis of the metacarpal head of the middle finger of the right hand. We treated the patient by curettage and multiple drilling, which led to significant functional improvement by the time of the 1-year follow-up.

Case Report

A 51-year-old right hand-dominant male businessman presented with a 2-week history of sudden onset of pain in the region of the right middle metacarpophalangeal joint with limitation of flexion. He had no history of any predisposing systemic illness such as autoimmune disease or steroid use. The patient had sustained no previous trauma to the metacarpophalangeal joint.

Clinical examination of the right middle metacarpophalangeal joint revealed mild swelling

[1]Department of Orthopedic Surgery, Far Eastern Memorial Hospital, and [2]Department of Orthopedics, College of Medicine, National Taiwan University Hospital, Taipei, Taiwan.

Received: January 10, 2007
Revised: March 19, 2007
Accepted: July 3, 2007

***Correspondence to:** Dr Wen-Chih Chen, Department of Orthopedic Surgery, Far Eastern Memorial Hospital, No. 21, Section 2, Nan-Ya South Road, Taipei 220, Taiwan. E-mail: fk3927@mail.femh.org.tw

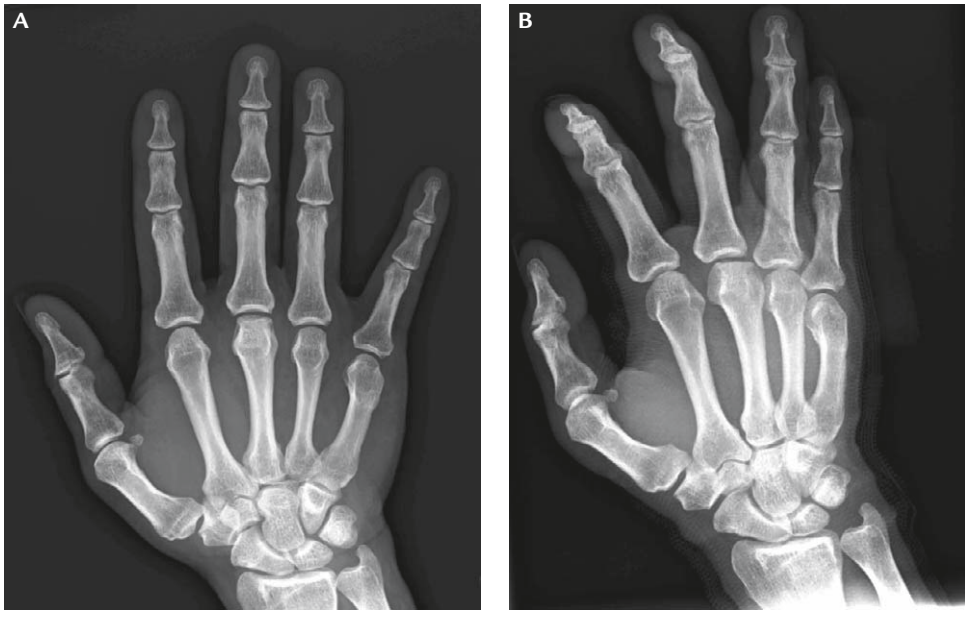

Figure 1. Posteroanterior radiographs of the right hand. (A) Preoperative radiograph shows flattening of the third metacarpal head with oval cystic lesions and sclerotic changes indicating osseous necrosis. (B) Radiograph after curettage and drilling.

without obvious erythema and local heat. The active range of motion of the involved joint was 50° of flexion with an extension lag of 20°. Both active and passive movement of the joint was painful. Screening tests were negative for signs of systemic infection or rheumatologic conditions. Radiographs revealed cystic lesions and sclerosis at the third metacarpal head of the right hand with mild flattening (Figure 1A). The patient was treated initially with nonsteroidal anti-inflammatory medication. However, the symptoms continued to progress and operative treatment was suggested.

Under endotracheal general anesthesia, the patient was placed in supine position. After disinfection and routine draping procedure, a pneumatic tourniquet with 250 mmHg pressure was applied around the right arm. The metacarpal head and neck were exposed subperiosteally after retraction of the extensor digitorum communis tendon through a 3-cm dorsal longitudinal skin incision. Obvious synovitis was found around the affected joint, and cartilage erosion was found at the peripheral area of the joint. Several small pieces of bone–cartilage flap were found inside the affected joint with mild hemarthrosis. Bare bone at the subchondral area of the third metacarpal head was also noted. We debrided the inflammatory synovium around the joint and the debris inside the joint. Then, the necrotic bone in the subchondral area of the third metacarpal head was curetted. Finally, multiple drilling with 0.16-cm Kirschner wires at the bare bone of the articular surface was performed (Figure 1B). After wound irrigation with normal saline and meticulous hemostasis, the wound was closed in layers. Pathology of the specimen showed dead bone, recognized by its empty lacunae, surrounded by necrotic adipocytes (Figure 2). After the operation, short arm splint was applied for 2 weeks and then full range of motion exercise without limitation was suggested.

At the 1-year follow-up evaluation, the patient had painless range of motion of the metacarpophalangeal joint with 80° flexion and no extension lag. He returned to his original work 2 weeks after the operation without limitation of daily activities (Figure 3). Radiographs showed no evidence of sclerosis or cystic changes in the metacarpal head. Although slight incongruity of the metacarpal head persisted, there was no additional loss of joint space (Figure 4).

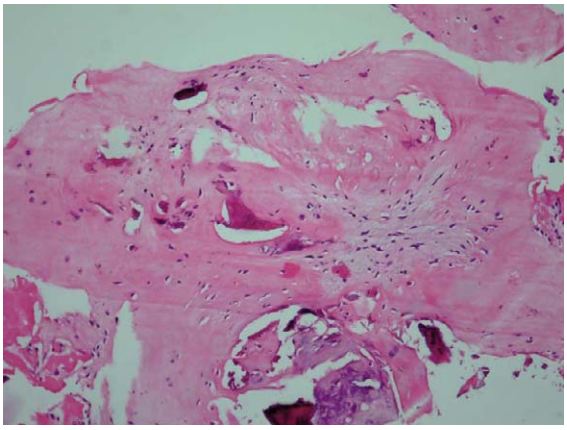

Figure 2. Pathology of the specimen shows dead bone, recognized by its empty lacunae, surrounded by necrotic adipocytes. It is compatible with osteonecrosis.

Discussion

Osteonecrosis of the metacarpal head is rare, and there are only a few reports in the English literature. This condition may be secondary to trauma[6,7] or steroid use;[3] it may also be seen in patients with systemic lupus erythematosus or in those who have had a renal transplantation.[8]

In addition, it has been reported to occur in association with Freiberg's disease.[2] Since the long finger is frequently the most prominent, repetitive minor trauma with excessive pressure on the metacarpal head may occur even during

Figure 3. At the 1-year follow-up, the patient had a painless range of motion of the metacarpophalangeal joint with 80° flexion and no extension lag.

Figure 4. Posteroanterior and oblique radiographs taken 1 year after curettage and drilling show healing of the cystic lesions and no evidence of sclerotic changes. However, slight deformity of the third metacarpal head is still present.

light daily activities. These episodes of blunt trauma may result in occult microfracture with joint effusion, which may compress the periosteal blood vessels to the distal epiphysis, causing osteonecrosis.

Osteonecrosis of the metacarpal head has been reported in all the metacarpal heads but appears to most commonly involve the long finger (46%). It is not yet clear whether this is related to its relatively longer length, protruding position at finger arch or specific vascular anatomy. The cadaver study by Wright et al in 1991 yielded a higher percentage of pericapsular arterioles in long finger metacarpal head blood supply than others.[9]

Because it is a rare disease, the optimal treatment is unclear. Various methods including splinting, curettage, bone grafting, joint arthroplasty[10] and flexion osteotomy of the metacarpal neck[11] have all been advocated for persistent symptomatic care. Surgical intervention is indicated for pain relief and functional improvement. In this case, we performed curettage and multiple drilling at the exposed bare bone, which led to a good functional outcome by the 1-year follow-up. Unlike some technically demanding procedures such as arthroplasty and osteotomy, we have introduced a simple surgical procedure with limited bone destruction, which led to a good result. Although osteonecrosis of the metacarpal head could be asymptomatic or self-limited by non-operative treatment, progression of degenerative change may occur in the long term.

References

1. Gannon JM, Engebretsen L, Aamodt A. Avascular necrosis of the metacarpal head in a shot-putter. *Scand J Med Sci Sports* 1995;5:107–9.
2. Gurin J. Joint occurrence of aseptic necrosis of the head of the third metacarpal and Freiberg's disease. *Acta Chir Hung* 1985;26:27–30.
3. Hagino H, Yamamoto K, Teshima R, et al. Sequential radiographic changes of metacarpal osteonecrosis. A case report. *Acta Orthop Scand* 1990;61:86–7.
4. Karlakki SL. Idiopathic avascular necrosis of the metacarpal head. *Clin Orthop Relat Res* 2003;406:103–8.
5. Dieterich H. Die subchondrale herderkrankung am metacarpale III. *Arch Klin Chir* 1932;171:555–67.
6. Smillie I. *Osteochondritis Dissecans*. London: Churchill Livingstone, 1960:31–6.
7. McElfresh EC, Dobyns JH. Intra-articular metacarpal head fractures. *J Hand Surg [Am]* 1983;8:383–93.
8. Al-Kutoubi MA. Avascular necrosis of metacarpal heads following renal transplantation. *Br J Radiol* 1982;55: 79–80.
9. Wright TC, Dell PC, Fla G. Avascular necrosis and vascular anatomy of the metacarpals. *J Hand Surg [Am]* 1991; 16:540–4.
10. De Smet L. Avascular necrosis of the metacarpal head. *J Hand Surg [Br]* 1998;23:552–4.
11. Wada M, Toh S, Iwaya D, et al. Flexion osteotomy of the metacarpal neck: a treatment method for avascular necrosis of the head of the third metacarpal. A case report. *J Bone Joint Surg Am* 2002;84:274–6.